

Robust Aeroservoelastic Control Utilizing Physics-Based Aerodynamic Sensing, Phase I

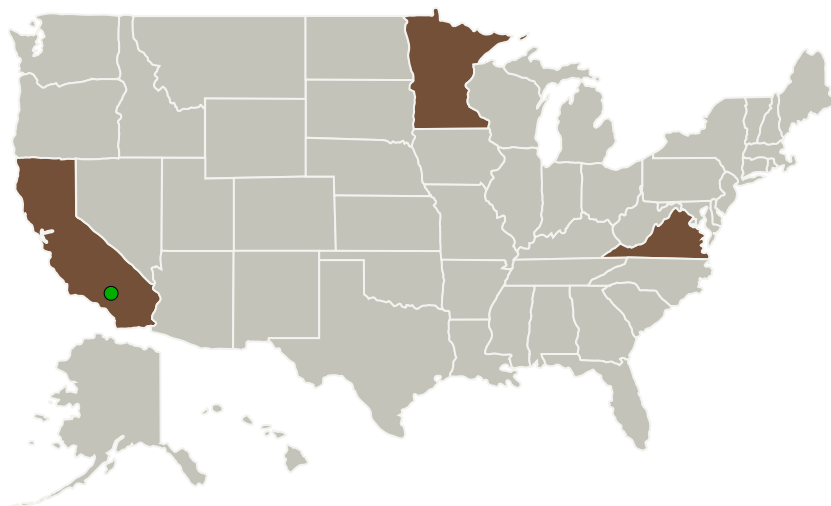
Completed Technology Project (2011 - 2012)



Project Introduction

New aircraft designs depend on an integrated active approach to flight control, flutter suppression and structural mode attenuation to meet desired handling quality performance and gust load alleviation. Tao Systems will team with Professor Gary Balas at the University of Minnesota to (1) develop a robust controller that demonstrates improved aerostructural performance over the state-of-the-art by utilizing a novel aerodynamic load sensor, and (2) provide a robust linear parameter varying controller that (a) requires no ad hoc methods of gain-scheduling, (b) provides robustness guarantees that more traditional methods do not offer, and (c) allows for explicit rate bounds enabling less conservative, higher performing controller designs. The benefits include improvement of aerodynamic and structural efficiency using robust aeroservoelastic control methods over a range of flight speeds, in the presence of significant turbulence.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Tao of Systems Integration, Inc.	Lead Organization	Industry Minority-Owned Business, Small Disadvantaged Business (SDB)	Hampton, Virginia
● Armstrong Flight Research Center(AFRC)	Supporting Organization	NASA Center	Edwards, California
University of Minnesota-Twin Cities	Supporting Organization	Academia	Minneapolis, Minnesota

Primary U.S. Work Locations

California	Minnesota
Virginia	

Project Transitions

▶ **February 2011:** Project Start

✓ **February 2012:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/140242>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Tao of Systems Integration, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Arun Mangalam

Co-Investigator:

Arun Mangalam

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Technology Maturity (TRL)

Start: **1**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX15 Flight Vehicle Systems
 - └ TX15.1 Aerosciences
 - └ TX15.1.3 Aeroelasticity

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System